



Two new species of *Fibuloides* (Lepidoptera: Tortricidae) from eastern Thailand

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Abstract

Two new species of *Fibuloides* are described from eastern Thailand: *F. tratensis* Jaikla and Pinkaew, n.sp., and *F. bulla* Jaikla and Pinkaew, n.sp. Males of *F. tratensis* have modified labial palpi with specialized scales that have not been reported for other Tortricidae. Descriptions and illustrations of adults and genitalia are provided for the two new species collected from Trat Agroforestry Research and Training Station, eastern Thailand.

Key words: Eucosmini, *Fibuloides tratensis*, *Fibuloides bulla*, new species, labial palpi, Olethreutinae, secondary sex scales, Trat Agroforestry Research and Training Station

Introduction

Fibuloides Kuznetsov, 1997 was proposed with *F. modificana* Kuznetsov, from south Vietnam, as the type species. Currently the genus includes 28 described species that are distributed throughout the Australian, Oriental, and Palearctic regions, with the greatest species richness recorded from Southeast Asia, where 17 species are known. Members of the genus are known to use Fagaceae, Ericaceae, Rasaceae, and Sapindaceae as larval host plants (Kuznetsov 2001, Liu and Li 2002, Razowski 1989).

Eleven species of *Fibuloides* have been recorded from Thailand: *Fibuloides cyanopis* (Meyrick), *F. corinthia* (Meyrick), *F. euphlebia* Kawabe, *F. japonica* Kawabe, *F. macrosaris* (Meyrick) by Kawabe (1989); *F. bicucullus* (Pinkaew), *F. vaneae* (Pinkaew), and *F. munda* (Diakonoff) by Pinkaew *et al.* (2005); *F. khaonanensis* Pinkaew by Pinkaew (2008); and *F. geniculata* Pinkaew and Zhang and *F. khaoyai* Pinkaew and Zhang by Pinkaew and Zhang (2012). In this paper two additional species are described. They were collected from a managed agroforestry area that differs from natural habitats.

Materials and Methods

Study site. Trat Agroforestry Research and Training Station (112° 40' N, 120° 40' E) is located in Trat Province in eastern Thailand, approximately 32 km from the city of Trat. Elevation ranges between 20–30 m above mean sea level. The vegetation is moist evergreen forest dominated by *Anthrocephalus chinensis* (Rubiaceae) and *Pakia timoriana* (Mimosaceae) (KURDI, 2006). During January–December 2012, annual rainfall was 3,153 mm. The average yearly temperature was 27°C with a maximum of 36°C and a minimum of 20°C. Relative humidity averaged 91% with a maximum of 92% and a minimum of 90%.

Specimens were collected with a 20-watt blacklight powered by a car battery. Latitude and longitude were

recorded with a Magellen GPS315. In the laboratory, an Olympus SZ40 stereomicroscope with an ocular micrometer was used to examine and measure the specimens. Forewing length was measured from the outer edge of the tegula at the wing base to the outermost edge of the fringe scales at the apex. An Olympus CH2 compound microscope was used for examining microtrichia, cornuti, and other characters of the genitalia. Terminology for forewing pattern follows Brown and Powell (1991) as refined by Baixeras (2002). Methods of genitalia dissection were adapted from Common (1990). Adults were photographed with a Canon DSLR 5D mark II and 100 mm macro lens. Genitalia were photographed with a Leica DM750 compound microscope with an ICC50 HD camera module. Genitalia photographs were refined using Helicon Focus 5.1 and Photoshop CS3. Holotype of two new species described herein are deposited in the Natural History Museum, London (BMNH), and paratypes were deposited in Kasetsart Kamphaengsaen Insect Collection (KKIC), Nakhon Pathom, Thailand and The Thailand Natural History Museum (TNHM).

***Fibuloides tratensis* Jaikla and Pinkaew, n. sp.**

(Figs. 1A–B, 2, 3A, 4A)

Diagnosis. The shape and position of the labial palpi in the male are most similar to those of *F. phycitipalpia* Horak, they arise vertically and are appressed to the frons. However, the labial palpi of *F. tratensis* are much shorter and broader and the inner surface of the second segment is only sparsely covered with scales; in contrast, the labial palpi of *F. phycitipalpia* are longer and more slender. The long, slender, modified scales on distal end of the second segment of the labial palpi and lower frons in the male of *F. tratensis* are unique within Olethreutinae and easily distinguished this species from all congeners. The phallus of *F. tratensis* is most similar to those of *F. neaera* (Meyrick) and *F. geniculata* Pinkaew and Zhang. However, *F. tratensis* differs from *F. neaera* and *F. geniculata* in forewing pattern and in the presence of three large flattened spiniform setae from the outer surface of the valva; in the latter species there are many more large flattened spiniform setae.



FIGURE 1. Adults of *Fibuloides* spp. (scale bars = 2 mm). A. *F. tratensis* Jaikla and Pinkaew, n. sp. (holotype, male). B. *F. tratensis* Jaikla and Pinkaew, n. sp. (paratype, female). C. *F. bulla* Jaikla and Pinkaew, n. sp. (holotype, male). D. *F. bulla* Jaikla and Pinkaew, n. sp. (paratype, female).

Description. Head: Vertex light brown to brown mixed with dark brown laterally; upper frons light brown mixed with brown, lower frons light brown, male with vertical ridge medially, covered with short, appressed scales

mixed with dense, long, slender yellowish white scales, pointing outward (Fig. 2C); labial palpus in male appressed to the frons and rising upwardly (natural position) (Fig. 2A), with first segment dark brown, second segment light brown with three, dark brown, transverse bands (at base, middle and apex), with inner surface bearing shallow excavation at 2/3 length and covered with dense, appressed, light brown scales, tip with group of moderately dense, long, narrow, light brown scales, apical segment narrow, orange white (Fig. 2D); female with labial palpus long and porrect, first segment dark brown, second segment triangular, distally greatly widened, light brown with three, dark brown, transverse bands (at base, middle and apex), apical segment short, dark brown (Fig. 2B); male antenna with notch at the first segment of flagellum.

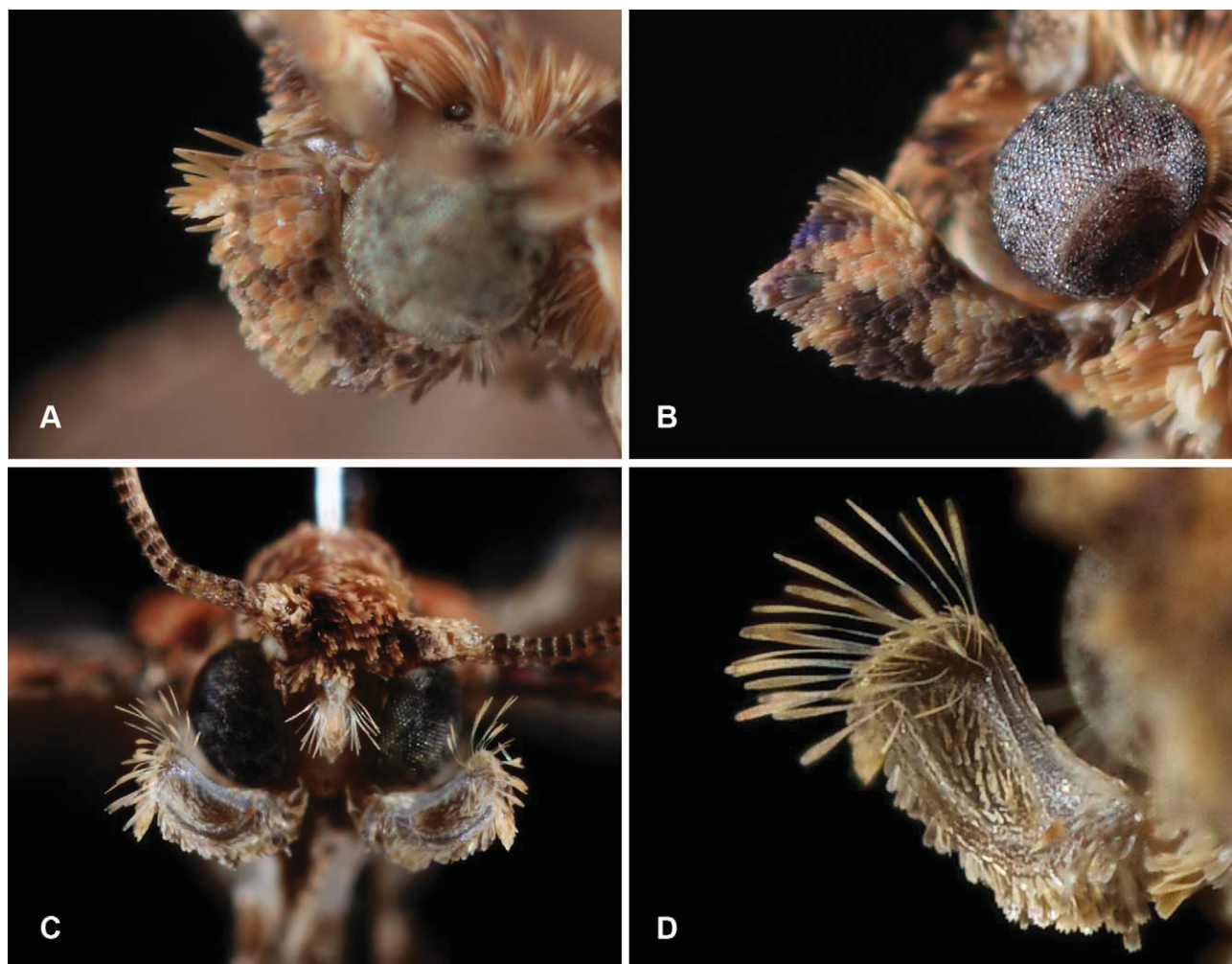


FIGURE 2. Head of *F. tratensis* Jaikla and Pinkaew, n.sp. A. Labial palpi of male in natural position (paratype). B. Labial palpi of female in natural position (paratype). C. Lower frons with long, narrow scales (holotype, male). D. Inner surface of labial palpi (second segment) showing group of raised scales apically (holotype, male).

Thorax: Pronotal collar brown mixed with dark brown; mesothorax with tegula light brown mixed with brown; mesonotum light brown to brown with irregular, transverse band medially, with orange white scales on posterior 1/4. Forewing (Figs. 1A–B) length 3.8–4.2 mm in males (n=8), 4.3–4.5 mm in females (n=2); male costal fold absent; termen slightly concave below apex, between R_5 and M_1 ; ground color light brown; costal strigula 1 indistinct, strigulae 2–4 and 7–9 paired, strigulae 5 and 6 single, pale orange white, paired strigulae separated by dark brown spots, termen with strigula 10 forming pale yellow spot between R_5 and M_1 ; basal fascia indistinct, brown mixed with dark brown; subbasal fascia present as small subtriangular spot on costa and extending as irregular transverse narrow band to inner margin, brown mixed with dark brown; median fascia fused with postmedian fascia, forming distinct subtriangular patch on costa, dark brown, extending from costa to midwing; preterminal fascia present as short and oblique band, brown, extending outward from costa to R_5 near outer margin, wing apex brown mixed with dark brown, strigulae 5, 6 and 7 with oblique silvery striae, confluent at R_3 and

extending from R_3 to dorsum near tornus, strigula 8 with oblique silvery stria extending to R_4 , strigula 9 with short, transverse silvery stria extending to R_5 , a narrow, oblique brown band between strigulae 7 and 8 extending to R_5 , ocellar region with irregular, transverse narrow line, dark brown, extending from R_5 to tornus and silvery stria beyond extending from M_1 to between CuA_1 and CuA_2 , outer margin with narrow line, brown, extending from between R_5 and M_1 to CuA_1 . Underside greyish brown, strigulae on costa and termen yellowish grey. Hindwing brown dorsally, greyish brown ventrally, except basal 2/3 of both sides covered with dark brown, narrow scales.

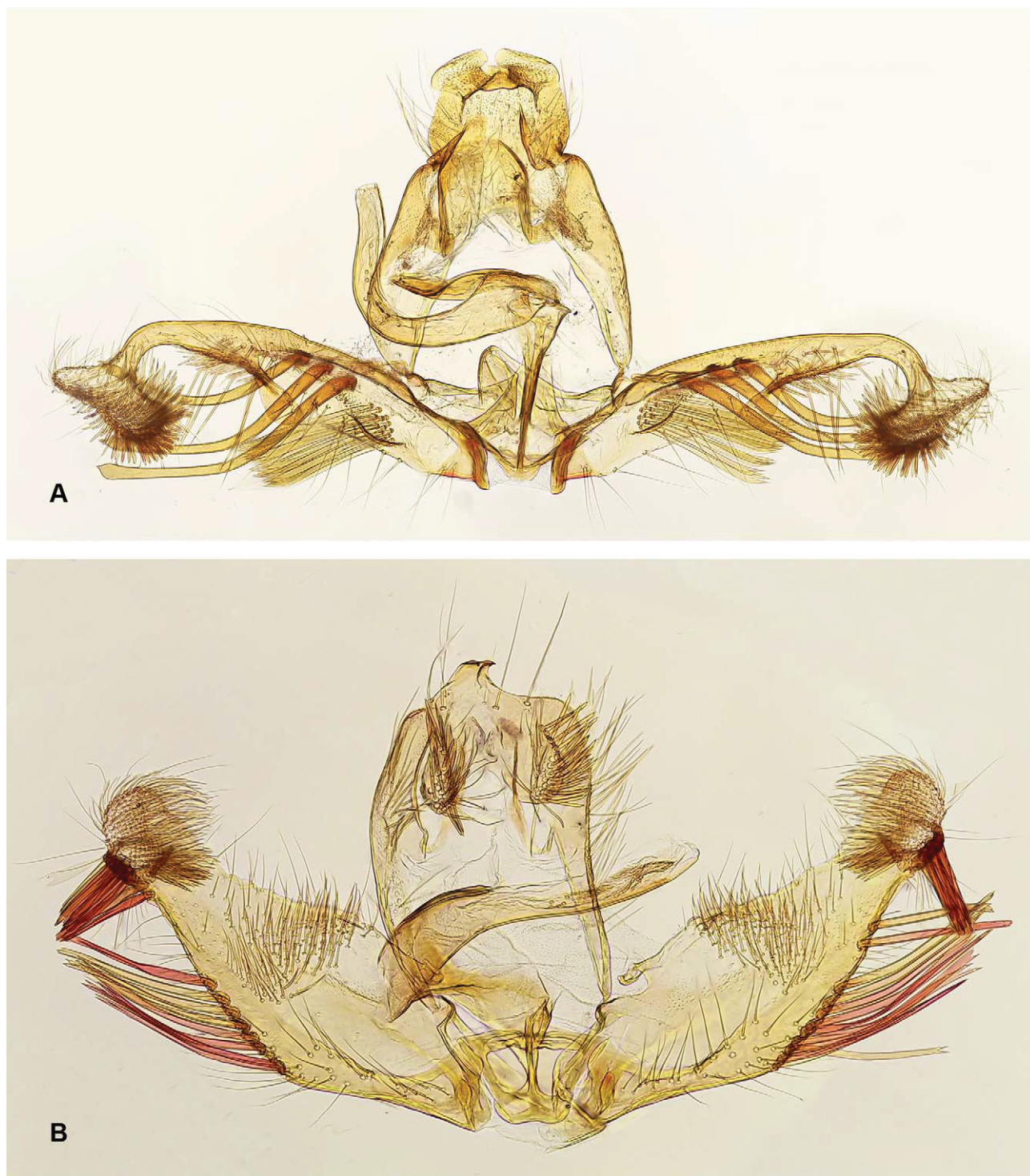


FIGURE 3. Male genitalia of *Fibuloides* spp. A. *F. tratensis* Jaikla and Pinkaew, n. sp. (KKIC slide no. NP 1545). B. *F. bulla* Jaikla and Pinkaew, n. sp. (KKIC slide no. NP 1547).

Abdomen: Male genitalia (Fig. 3A) with tegumen widest in middle, dorsally with pronounced shoulders. Uncus distally bipartite, dilated medially, apices round, bent, spatulate. Socii subtriangular, moderately large, sparsely setose. Gnathos arising from mid-length of tegumen, moderately sclerotized, with two parallel, dorsally rising bands. Valva long and slender with moderately large basal excavation, small subtriangular lobe on ventral margin near middle of valva, with a cluster of spiniform setae and three flattened, widened spiniform setae arising from outer surface, neck very slender, inner surface with patch of dense setae at base of cucullus; cucullus small, transversely extended, peanut-shaped, dorsal portion small and narrow, apex rounded, moderately setose, ventral portion widened, tip round, with dense spiniform setae; juxta triangular; anellus closely surrounding base of phallus, cuplike, dorsally with plate extending to mid-length of phallus; phallus long, bent upward at right angle in middle, with seven, non-deciduous cornuti. Female genitalia (Fig. 4A) with sternum VII with large sclerotized plate, with deep, U-shaped medial emargination in posterior margin; densely scaled except on posterior 1/4, medially with curved patch of dense, small sclerotized ridges and microtrichia. Tergum VIII with dense microtrichia on anterior half, lateral triangular extensions sparsely setose, anterior 1/3 with dense microtrichia, scales absent. Papillae anales with dense setae; apophyses short and stout, anteriores slightly longer than posteriores; ostium bursae opening into a wide shallow cup fused with emargination of S7; lamella postvaginalis forming a transverse band with a well-sclerotized posterior margin in middle, spinulose, more densely scaled lateroposteriorly, anteromedially without scales and microtrichia, with patch of dense microtrichia extending on membrane laterally beyond lamella postvaginalis; ductus bursae rather short, widened towards corpus bursae; colliculum moderately large, sclerotized, not encircling ductus bursae, followed by a short membranous portion with large sclerotized, bi-pronged plate narrowly encircling ductus bursae near middle and the two pointed prongs extending into bursae; ductus seminalis arising from anterior 1/3 of ductus bursae; corpus bursae spinulose, except around the two slender blade-like signa.

Holotype. ♂. Thailand: Trat Prov.: Trat Agroforestry R. St., 12°23'43"N 102°40'32"E, ca. 30 m, 18–19 Aug 2012, N. Pinkaew; np 5334; KKIC slide no. NP 1545. Deposited in BMNH.

Paratypes. Thailand: Trat Prov.: Trat Agroforestry R. St., 12°23'43"N 102°40'32"E, ca. 30 m, 19–20 Oct 2011 (1♀) (np 4849; KKIC genitalia slide NP 1549); 19–20 Oct 2011 (1♂), (np 4832; KKIC genitalia slide NP 1541), deposited in TNHM; 24–25 Dec 2011 (1♂) (np 5154; KKIC genitalia slide NP 1542); 21–23 Apr 2012 (1♀) (np 5017; KKIC genitalia slide NP 1546); 17–18 Feb 2012 (3♂) (np 4959; KKIC genitalia slide NP 1538, np 4975 KKIC genitalia slide NP 1539, np 4970; KKIC genitalia slide NP 1543); 16–18 Jun 2012 (2♂) (np 5118; KKIC genitalia slide NP 1540, np 5075; KKIC genitalia slide NP 1537), all N. Pinkaew. Deposited in KKIC.

Distribution. Thailand (Trat).

Etymology. The species name refers to the type locality of Trat province.

***Fibuloides bulla* Jaikla and Pinkaew, n. sp.**

(Figs. 1C–D, 3B, 4B)

Diagnosis. This species is most similar to *F. tratensis* in forewing pattern, but the two species differ the male and female genitalia. The frons and labial palpi of the male of *F. bulla* lack modified scales characteristic of *F. tratensis*. *F. bulla* is distinguished by a dense cluster of long, parallel spiniform setae on the ventral part of the cucullus, which is unique and easily separates it from all other congeners.

Description. Head: Upper frons yellowish white with lateral areas narrowly dark brown, lower frons yellowish white; vertex pale grey mixed with brown to dark brown laterally; labial palpus of male and female long, porrect, first segment light grey, second segment triangular, distally greatly widened, yellowish white, with brownish grey spots at base, dorsomedially, ventromedially and apex, apical segment yellowish white; male antenna with notch at of basal segment of flagellum.

Thorax: Pronotal collar brown mixed with dark brown; mesothorax with tegula light brown mixed with dark brown; mesonotum light brown with diffuse spots, brown to dark brown. Forewing (Figs. 1C–D) length 3.5–3.8 mm in males (n=3), 5.0 mm in female (n=1); male costal fold absent; termen slightly concave between R_5 and M_1 ; ground color light brown with diffused transverse, narrow, darker streaks; costal strigula 1 indistinct, strigulae 2–4 and 7–8 paired, strigulae 5, 6 and 9 single, light brown, paired strigulae separated by dark brown spots, termen with strigula 10 forming yellowish white spot between R_5 and M_1 ; basal fascia present as irregular patch extending from

costa to midwing; subbasal fascia a dark brown, subrectangular patch extending from strigula 2 to 3 and from costa to R; median fascia a distinct, dark brown, oblique patch extending from costa to middle of discal cell, separated from small dark brown spot at base of M_2 ; postmedian fascia present as short, oblique brown band, extending outward from costa to R_5 , wing apices brown mixed with dark brown, strigula 6 with irregular silvery stria extending from R_2 to inner margin, strigula 7 with silvery stria extending obliquely to R_5 , ocellar region with irregular transverse band, brown mixed with dark brown, extending from R_5 to tornus, near outer margin with short, transverse silvery stripe between M_2 and CuA_1 near outer margin, outer margin with narrow line of dark brown scales, extending from M_1 to CuA_1 . Hindwing brown. Underside of forewing greyish yellow, strigulae on costa yellowish grey, strigula on termen yellowish white; underside of hindwing light brown.

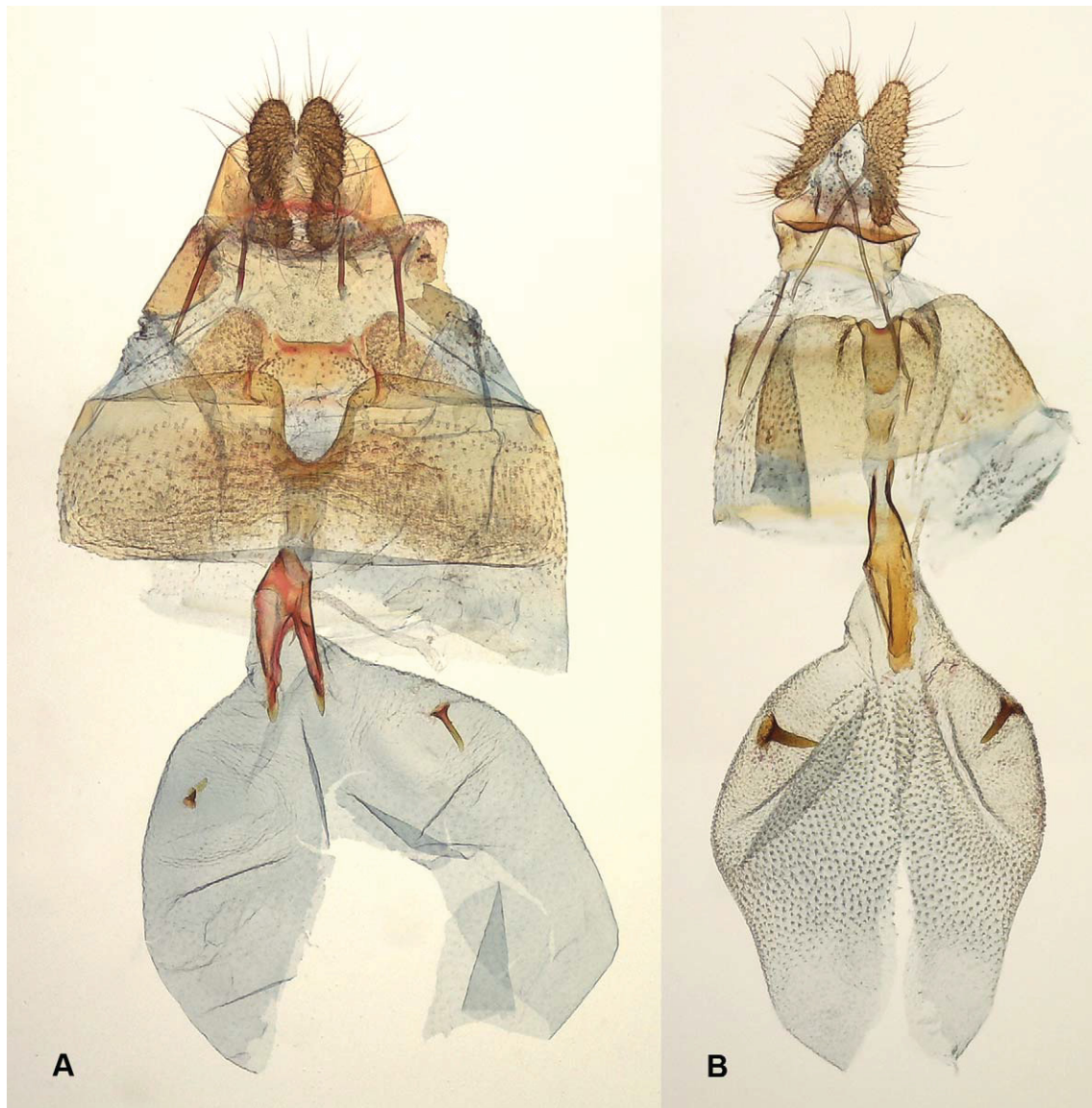


FIGURE 4. Female genitalia of *Fibuloides* spp. A. *F. tratensis* Jaikla and Pinkaew, n.sp. (KKIC slide no. 1546). B. *F. bulla* Jaikla and Pinkaew, n.sp. (KKIC slide no. 1548).

Abdomen: Male genitalia (Fig. 3B) with tegumen densely setose laterally, elongate subrectangular, shoulders with dense microtrichia. Uncus short, small, bifid, subtriangular, pointing outward. Socii moderately large, teardrop-shaped, pendent, from base of uncus, with dense spiniform setae mixed with less dense smaller ones. Gnathos arising near mid-length of tegumen, with two rising bands, moderately sclerotized. Valva straight and rather wide subbasally, with large basal opening, with dense microtrichia from near base of sacculus to neck; sacculus sparsely setose basally, posterior margin to neck with patch of dense setae, dorsal and ventral margin sparsely setose, ventral margin with row of large, flattened spiniform setae with multidentate apices from outer

surface of valva; neck sparsely setose; cucullus simple, short, rounded, densely setose, base of inner surface with group of dense, narrow spines, pointing basally, ventral margin with dense cluster of moderately long, flattened spiniform setae; juxta subtrapezoid, caulis moderately long; anellus closely surrounding basal 1/5 of phallus; phallus moderately long, sinuate, with five, deciduous cornuti. Female genitalia (Fig. 4B) with sternum VII moderately sclerotized, moderately densely scaled, scales denser near posterior margin, except sparsely setose near sterigma, posterior margin with small U-shaped emargination medially. Tergum VIII with two wide, shallow pouches, lateral triangular extensions with dense scales, moderately dense setae and microtrichia. Papillae anales densely setose; apophyses anteriores long and slender (same length as apophyses posteriores); sterigma simple, ostium bursae rather small, fused with emargination of posterior margin of S7, antrum forming narrow sclerotized cup, 1/4 length of ductus bursae; ductus bursae moderately long, widened toward corpus bursae, colliculum small, moderately sclerotized, not encircling ductus bursae, with large sclerotized bi-pronged plate narrowly encircling ductus bursae near middle and with two band-like projections with rounded tips extending into posterior portion of corpus bursae; corpus bursae spinulose except around two strong, blade-like signa with acute tips, left one larger than right one.

Holotype. ♂. Thailand: Trat Prov.: Trat Agroforestry R. St., 12°23'43"N 102°40'32"E, ca. 30 m, 12–14 Oct 2012, N. Pinkaew; np 5526; KKIC slide no. NP 1547. Deposited in BMNH.

Paratype. Thailand: Trat Prov.: Trat Agroforestry R. St., 12°23'43"N 102°40'32"E, ca. 30 m, 12–14 Oct 2011 (1♀) (np 5527; KKIC genitalia slide NP 1548); 18–19 Aug 2012 (2♂) (np 5371; KKIC genitalia slide NP 1544), 12–14 Oct 2011 (np 5528; KKIC genitalia slide NP 1550), all N. Pinkaew *et al.* Deposited in THNM and KKIC.

Distribution. Thailand (Trat).

Etymology. The specific name is derived from Latin *bulla* (=bubble), referring to the shape of the cucullus.

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